

DOC 5 ANNEX 4

10/625 248  
N6V 17 03

(12) UK Patent Application (19) GB (11) 2 314 827 (13) A

(43) Date of A Publication 14.01.1998

(21) Application No 9613526.4

(22) Date of Filing 27.05.1996

(71) Applicant(s)

Robinson & Sons Limited

(Incorporated in the United Kingdom)

Wheatbridge, CHESTERFIELD, Derbyshire, S40 1YE,  
United Kingdom

(72) Inventor(s)

Craig Ernest Done

(74) Agent and/or Address for Service

A A Thornton & Co  
Northumberland House, 303-306 High Holborn,  
LONDON, WC1V 7LE, United Kingdom

(51) INT CL<sup>6</sup>

B65D 3/00

(52) UK CL (Edition P)

B8D DCA1 D1A4B2 D1B1 D1C D7C  
U1S S1452

(56) Documents Cited

GB 2053852 A GB 0459786 A GB 0414281 A  
GB 0390703 A US 4971241 A US 3949927 A

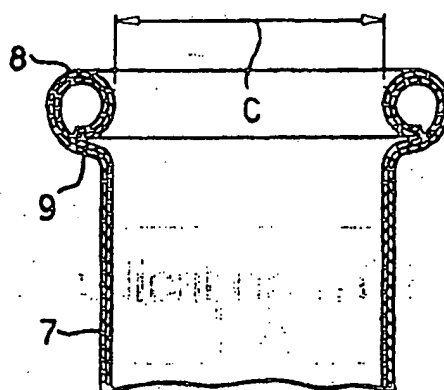
(58) Field of Search

UK CL (Edition O) B8D DCA1 DCA2 DCB DCW3  
DCW9, B8P PK4, F2P PA6  
INT CL<sup>6</sup> B65D 3/10 3/12 3/14 3/16 3/18 3/28  
ONLINE:WPI

(54) Paperboard tube with beaded end

(57) A paperboard tube, for example for particulate or powder materials comprises a main body formed with a bead (8). The bead (8) is inwardly curled, but is displaced radially outwardly relative to the normal position of inwardly curled bead. To this end, the bead is connected to the main body of the tube by a portion of material (9) which extends radially outwardly from the main body of the tube. With such an arrangement, the inside diameter (C) of the bead can be substantially the same as the inside diameter of the tube, thereby allowing a closure to be pushed through the bead into sealing engagement with the inside wall of the main body of the tube. At the same time, the finer material is not exposed at the bead, because the bead is inwardly curled.

Fig.3.



GB 2 314 827 A

Fig.1.

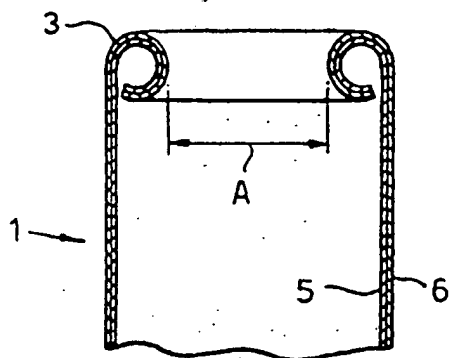


Fig.4A.

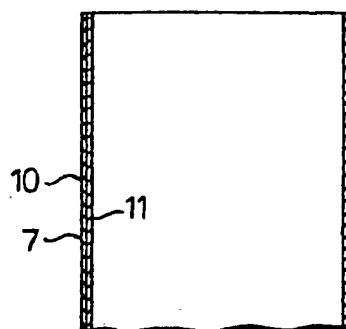


Fig.2.

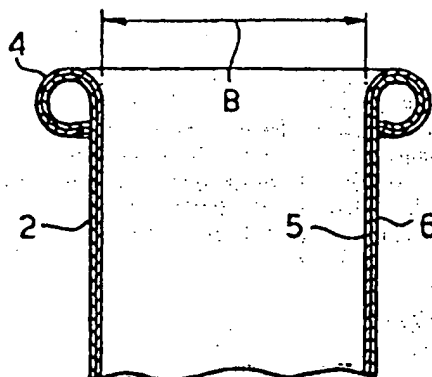


Fig.4B.

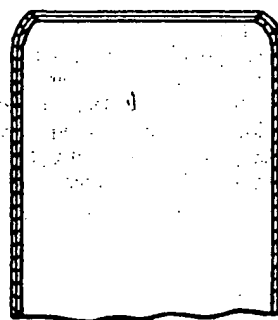


Fig.3.

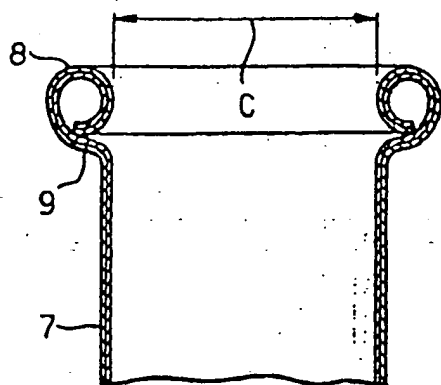


Fig.4C.

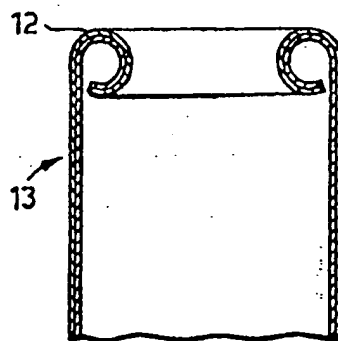
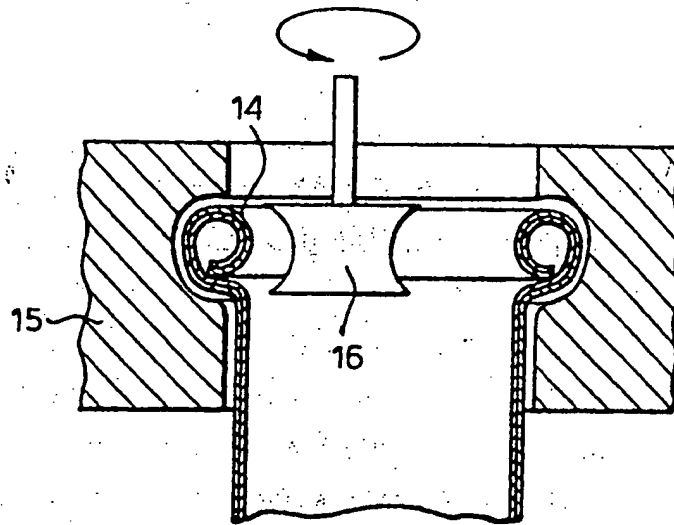


Fig.4D.



PAPERBOARD TUBE WITH BEADED END

This invention relates to a paperboard tube with a beaded end. Tubes according to the preferred embodiments of the invention are useful in packaging, and to this end the paperboard tube will often be used to form a container having a bead at one end, and closed at the other end by a suitable base. It is to be understood, however, that the present invention is not limited to such containers and is applicable to any paperboard tube having one or both ends formed with a bead in accordance with the invention.

The paperboard tubes are used extensively in the packaging of many products, and are particularly commonly used in the packaging of dry particulate or powder products for retail sale. When used in this way, the paperboard tube will normally be furnished with a base and a removable lid. For many applications, it is important that the lid can be repeatedly removed and replaced. In order to protect the free edge of the tube and facilitate repeated removal and replacement of the lid it is common practice to form a bead at the free end of the tube. Such beads are typically inward beads as illustrated in Figure 1 of the accompanying drawings, or outward beads as illustrated in Figure 2 of the drawings.

Both the prior art inward and outward beads illustrated in Figures 1 and 2 suffer from disadvantages. In the case of the inward bead, the diameter of the mouth formed by the bead is less than the diameter of the tube itself. This arrangement leads to certain difficulties, for example the free flow of powder product from the container will be inhibited by the presence of the bead.

14827

Also, a closure press fitted within the bead cannot contact the main wall of the tube with the result that only a limited seal between the closure and the tube can be effected. The problems outlined above are not present in the case of the outward bead as illustrated in Figure 2. In this case, however, formation of the bead exposes the liner material of the tube to view from the exterior of the packaging. This is aesthetically unsatisfactory.

According to one aspect of the present invention a paperboard tube is formed with an inward bead which is connected to the main body of the tube by a portion of tube material which extends radially outwardly from the main body.

With such an arrangement, the inside diameter of the bead may be substantially equal to the inside diameter of the main body of the tube. This arrangement avoids the difficulties of the relatively narrow inside diameter of the conventional inward bead of Figure 1. Also, because the bead is an inward bead the facing material of the tube extends over the entire outer surface of the bead and thereby the problem of visible liner associated with the normal outward bead of Figure 2 is avoided.

According to another aspect of the present invention a paperboard tube with an inward bead which is connected to the main body of the tube by a portion which extends radially outwardly from the main body of the tube is formed by forming an inward bead on the paperboard tube and then deforming the tube to locate the bead radially outwardly of its initial position.

The invention will be better understood from the following description of a preferred embodiment thereof, given by way of example only, reference being had to the accompanying drawings wherein:

Figures 1 and 2 illustrate schematically in longitudinal cross-section conventional inward and outward beads formed on

paperboard tubes;

Figure 3 is a view corresponding to Figures 1 and 2 illustrating a preferred embodiment of the invention; and

Figures 4A - 4D illustrate the sequential steps in forming the paperboard tube of Figure 3.

Referring firstly to Figures 1 and 2, there is illustrated in longitudinal cross-section paperboard tubes 1,2 having respectively a conventional inward bead 3 (Figure 1) and a conventional outward bead 4 (Figure 2). As will be understood by those skilled in the art the paperboard tubes 1,2 each comprise an inner surface 5 formed by a liner material and an outer surface 6 formed by a label material. In general, the liner material and the label material will have contrasting appearances, the liner material being selected for its functional characteristics in light of the product to be packed in the tube, and the label being selected in light of aesthetic considerations. With the tube of Figure 1 the visible surfaces of the bead 3 are formed by the label which is desirable for products required to have an overall aesthetic appeal. However, the inside diameter A of the bead 3 is less than the inside diameter of the main body of the tube 1 which gives rise to well recognised disadvantages. In the case of the arrangement of Figure 2 the inside diameter B of the bead is equal to the inside of diameter of the main body of the tube. However, the visible surface of the bead is formed by the liner, material which is aesthetically undesirable.

Referring now to Figure 3, the paperboard tube 7 is formed with an inward bead 8 - i.e. a bead which is formed by curling the material of the board inwardly relative to the axis of the tube 7. However, the bead 8 is connected to the main body of the tube by a portion of tube material 9 which extends radially

outwardly from the main body of the tube. The effect of this arrangement is to locate the inward bead 8 radially outwardly relative to the position it would assume in the conventional bead of Figure 1. Accordingly, the inside diameter C of the bead can be made substantially equal to the inside diameter of the main body of the tube 7. This obviates the problem of the narrow entrance A of Figure 1. At the same time, the fact that the bead is an inward bead means that the visible surface of the bead is formed of label material and accordingly the problem of the exposed liner of Figure 2 is removed.

Referring now to Figures 4A - 4D the sequence of steps by which the tube of Figure 3 is formed is illustrated. Initially, a conventional spiral wound paperboard tube 7 having a label 10 and a liner 11 is formed with an inward bead 12 using conventional bead-forming machinery. The pre-form 13 of Figure 4C is then placed in the cavity 14 of a split ring cavity tool 15 and an eccentric former 16 is introduced into the neck of the tube. The former is then rotated is contacted with the tube to move the bead to the position illustrated in Figure 3.

It should be appreciated that, although in the preferred embodiment, the inside diameter of the bead substantially corresponds to the inside diameter of the main body of the tube, such an arrangement is not essential and it is possible that the degree of offset provided by the portion 9 is greater or less than that necessary to make the inside diameter of the bead equal to the inside diameter of the tube. Also, whilst in the preferred embodiment of the invention the portion 9 extends outwardly from the main body of the tube in a direction close to radial, the portion 9 may if preferred extend obliquely to the axis of the tube so that the bead is connected to the main portion of the tube by an obliquely extending portion of tube

material.



**CLAIMS:**

1. A paperboard tube having a substantially cylindrical main body and an inward bead formed at one end of the main body wherein the inward bead is connected to the main body by a portion of tube material which extends outwardly from the main body to the bead.
2. A paperboard tube having a substantially cylindrical main body and an inward bead formed at one end of the main body, the inward bead being formed by tube material which, in the zone of connection of the bead to the main body, extends outwardly from the main body and then turns radially inwardly to form the bead.
3. A paperboard tube according to claim 1 or claim 2 wherein the inside diameter of the bead is substantially equal to the inside diameter of the main body.
4. A paperboard tube according to any preceding claim wherein the material which extends outwardly from the main body in the zone of connection of the bead to the main body extends in a direction close to radial.
5. A paperboard tube substantially as hereinbefore described with reference to Figures 3, 4A, 4B, 4C and 4D of the accompanying drawings.
6. A method of making a paperboard tube according to any preceding claim comprising the sequential steps of forming an inward bead on a paperboard tube blank; placing the resultant pre-form in a cavity tool; and deforming the bead radially outwardly to lie at least partially within the cavity of the cavity tool.
7. A method according to claim 6 wherein the bead is deformed using an

eccentric former which is rotated in contact with the tube to move the bead radially outwardly.

8. A method of forming a paperboard tube, substantially as hereinbefore described with reference to Figures 4A, 4B, 4C and 4D of the accompanying drawings.



# The Patent Office

8

Application No: GB 9613526.4  
Claims searched: 1 to 8

Examiner: Mike Henderson  
Date of search: 16 September 1997

## Patents Act 1977

### Search Report under Section 17

#### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): B8D (DCA1 DCA2 DCB DCW3 DCW9) B8P (PK4) F2P(PA6)

Int Cl (Ed.6): B65D 3/10 3/12 3/14 3/16 3/18 3/28

Other: ONLINE:WPI

#### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2053852A (AMALGAMATED MINING & TRADING LTD) Fig. 4 particularly relevant)	1 to 3
X	GB 459786 (HUMOCO CORP) (Fig. 12 particularly relevant)	1, 2 & 4
X	GB 414281 (MARSHALL) (Figs 1 to 3 particularly relevant)	1 to 4
X	GB 390703 (RISTOW) (Figs 3 & 4 particularly relevant)	1 to 4
X	US 4971241 (WAGERS) (Fig. 3 particularly relevant)	1
X	US 3949927 (SMITH et al) (Figs 3 to 5 particularly relevant)	1 & 2

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☒ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**